भारतीय मानक
Indian Standard

IS 10502 : 2018

ग्वार गम, खाद्य ग्रेड — विशिष्टि

(दूसरा पुनरीक्षण)

Guar Gum, Food Grade — Specification

(Second Revision)

ICS 67.220.20

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली-110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.org.in www.standardsbis.in

September 2018 **Price Group 3**

Food Additives Sectional Committee, FAD 8

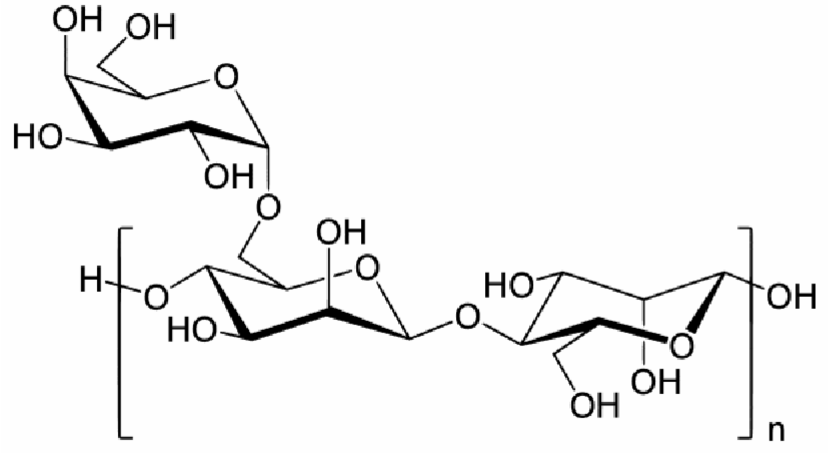
FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Food Additives Sectional Committee had been approved by the Food and Agriculture Division Council.

Guar gum, also called guaran, is a galactomannan. It is primarily the ground endosperm of guar beans. The guar seeds are dehusked, milled and screened to obtain the guar gum. It is typically produced as a free-flowing, off-white powder. It is permitted as a food additive under the *Food Safety and Standards (Food Products Standards and Food Additives) Regulations,* 2011.

Guar gum is one of the most highly efficient water-thickening agents available to the food industry and is widely used as a binder and volume enhancer. Its high percentage of soluble dietary fibre (80 to 85 percent), means that it is often added to bread to increase its soluble dietary fibre content. Guar gum is also commonly used to thicken and stabilize salad dressings and sauces and help improve moisture retention in finished baked goods. Guar gum is frequently used gums in gluten-free recipes and gluten-free products.

Chemically, guar gum is a polysaccharide composed of the sugars galactose and mannose. The backbone is a linear chain of β 1,4-linked mannose residues to which galactose residues are 1,6-linked at every second mannose, forming short side-branches.



This standard was first published in 1986. The standard was first revised in 1993 to take into account the latest trade practices for both internal use and exports. This revision is undertaken to harmonize the standard with the *Guar Gum Grading and Marking Rules,* 2010 and the requirements as given in JECFA Standards. Three grades of Guar Gum have been specified in this revision based on Galactomannan content. The requirements of lead and arsenic have been harmonized with the JECFA standards. Also the requirements of Residual Solvents, *E. Coli* and Total Viable Count have been included and that of Coliform count has been excluded in line with the latest JECFA Standard. In the preparation of this standard the requirements given in the following publications have been taken into consideration:

a) Codex General Standards for Food Additives (CSFA) SIN No. 412 of 2009.

b) *Guar Gum Grading and Marking Rules*, 2010, as per of the *Agricultural Produce (Grading and Marking) Act,* 1937 (1 of 1937)

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

GUAR GUM, FOOD GRADE — SPECIFICATION

(Second Revision)

1 SCOPE

This standard prescribes the grades, requirements and methods of sampling and test for guar gum, food grade, obtained by grinding the endosperm of *Cyamopsis tetragonolobus* (Linn) Taub, (Fam, Leguminosae).

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards.

IS No.	*Title*
460 (Part 2) : 1985	Test sieves: Part 2 perforated plate test sieves
1070 : 1992	Reagent grade water (*third revision*)
1699 : 1994	Methods of sampling and test for food colours
2491 : 2013	Food hygiene — General principles — Code of practice
5402 : 2012/ ISO 4833 : 2003	Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of micro-organisms — Colony count technique at 30°C by pour plate technique (*second revision*)
5887	Methods for detection of bacteria responsible for food poisoning:
(Part 1) : 1976	Isolation, identification and enumeration of *Escherichia coli* (*first revision*)
(Part 3) : 1999	General guidance on methods for detection of *Salmonella* (*second revision*)
7219 : 1973	Method for determination of proteins in foods and feed ingredients
7928 : 1992	Alginic acid, food grade (*first revision*)
9505 : 1980	Monosodium L-glutamate, food grade
16069 (Part 2) : 2013	Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds: Part 2 Colony count technique in products with water activity less than or equal to 0.95

3 GRADES

3.1 There shall be three grades of the material, namely Grades I, II and III based on purity as galactomannans.

4 REQUIREMENTS

4.1 Description

It shall be a white to yellowish-white, nearly odourless, free-flowing powder. It shall free from dirt, dust added colouring matter visible mould growth, insect infestation, black splits, stems, straw, chaff and obnoxious smell. It shall be obtained after multistage grinding of the guar seeds from guar pods. 100 percent of the material shall pass through 300 micron sieve [*see* IS 460 (Part 2)].

4.2 Identification

4.2.1 *Solubility*

Guar gum forms a solution in cold or hot water.

4.2.2 A water solution of guar gum having a *p*H between 5.4 and 6.5, gets converted to a gel by the addition of small amounts of sodium borate TS.

4.2.3 Transfer 2 g of the sample into a 400 ml beaker, moisten it thoroughly with about 4 ml of isopropanol, add with vigorous stirring 200 ml of water and continue the stirring until the gum is completely and uniformly dispersed. An opalescent, viscous solution is formed. Transfer 100 ml of the solution into another 400 ml beaker, heat the mixture in a boiling water bath for about 10 min and then cool to room temperature. There is no substantial increase in viscosity (differentiating guar gum from carob bean gum).

4.2.4 When tested as per the method given in Annex A, the product shall indicate the presence of galactose and mannose.

4.2.5 Place some ground guar gum in an aqueous solution containing 0.5 percent iodine and 1 percent potassium iodide on a glass slide and examine under a simple microscope. Guar gum shows close groups of round to pear formed cells; their contents are yellow to brown. (Locust bean gum contains long stretched tubiform cells, separate or slightly inter-spaced; their brown contents are much less regularly formed than in guar gum.)

4.2.6 *Presence of Borate*

Borates shall be absent when tested as per the method given below:

> Disperse 1 g of the sample in 100 ml of water. The dispersion should remain fluid and not form a gel on standing. Mix 10 ml of dilute hydrochloric acid with the dispersion, and apply one drop of the resulting mixture to turmeric paper. No brownish red colour is formed.

4.2.7 *Presence of Starch*

To a 1 in 10 aqueous solution of the gum add a few drops of iodine solution. No blue colour shall be produced.

4.3 Hygienic Conditions

The product shall be manufactured and packed under hygienic conditions (*see* IS 2491).

4.4 Microbiological Requirements

4.4.1 *Escherichia coli* shall be absent in 1g of the sample when tested in accordance with the method given in IS 5887 (Part 1).

4.4.2 *Salmonella* shall be absent in 25g sample when tested in accordance with the method given in IS 5887 (Part 7).

4.4.3 *Yeast and mould* shall not exceed 500/g when tested in accordance with the method given in IS 16069 (Part 2).

4.4.4 The total viable colony count shall not exceed 5 000/g at when tested in accordance with the methods given in IS 5402.

4.5 Residual solvents shall not be more than 1 percent of ethanol or isopropanol, singly or in combination when tested as per the method given in Annex D of this standard.

4.6 The material shall also conform to the requirements given in Table 1

5 PACKING, STORAGE AND MARKING

5.1 Packing

The material shall be packed only in sound clean, dry and un-used containers made of B-twill jute or in polythene bags placed in gunny bags or multi-ply craft paper sacks or any other material as agreed to between the purchaser and the supplier. The material shall be filled in containers with as little air space as possible. The containers shall be such as to preclude air contamination of the contents with metals or other impurities.

5.2 Storage

The material shall be stored in a cool and dry place so as to avoid excessive exposure to heat.

5.3 Marking

Each container shall be marked legibly to give the following information:

a) Name of the material including the words 'Food Grade';
b) Source of manufacture;
c) Net quantity when packed;
d) Batch or Code number;
e) Date of manufacture;
f) Instruction for storage;
g) Best before date (month and year to be given by the manufacturer); and

Table 1 Requirements for Guar Gum, Food Grade
(*Clauses* 3.1, 4.6 *and* 7.1)

Sl No.	Characteristic	Requirement			Method of Test, Ref to
		Grade I	Grade II	Grade III	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Purity as galactomannans, percent by mass, *Min*	80.0	70.0	55.0	Annex B
ii)	Loss on drying, percent by mass, *Max*	11.0	12.0	13.0	**A-2** of IS 7928
iii)	Total ash, percent by mass, *Max*	0.5	1.0	1.5	**A-4** of IS 7928
iv)	Acid insoluble ash, percent by mass, *Max*	0.01	0.02	0.05	**A-5** of IS 7928
v)	Protein (N × 5.7), percent by mass, *Max*	9.0	9.0	9.0	IS 7219
vi)	Acid insoluble matter, percent by mass, *Max*	3.0	5.0	7.0	Annex C
vii)	Lead (as Pb), mg/kg, *Max*	2.0	2.0	2.0	**15** of IS 1699
viii)	Arsenic (as As), mg/kg, *Max*	1.0	1.0	1.0	**15** of IS 1699
ix)	Heavy metals (as Pb), mg/kg, *Max*	40	40	40	**16** of IS 1699

h) Any other requirements as specified under the *Legal Metrology (Packaged Commodities) Rules,* 2011 and *Food Safety and Standards (Packaging and Labelling) Regulation*, 2011 and the Rules framed thereunder.

5.4 BIS Certification Marking

The container may also be marked with the Standard Mark.

5.4.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 SAMPLING

The representative samples of the material shall be drawn and conformity of the material to the requirements of this standard shall be determined according to the procedure prescribed in **4** of IS 1699.

7 TESTS

7.1 Tests shall be carried out by the methods specified in **4.2**, **4.4** and col 4 of Table 1.

7.2 Quality of Reagents

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the result of analysis.

ANNEX A

(*Clause* 4.2.4)

IDENTIFICATION OF SUGARS

Boil mixture of 100 mg of the samples and 20 ml of 10 percent sulphuric acid for 3 h. Allow to cool and add excess barium carbonate, mixing with a magnetic stirrer until the solution is of *p*H 7, and filter. Evaporate the filtrate in a rotary evaporator at 30-50°C in vacuum until a crystalline (or syrupy) residue is obtained. Dissolve in 10 ml of 40 percent methanol. This is the hydrolysate. Place 1 to 10 microlitre spots of hydrolysates on the starting line of two chromatoplates and spots containing 1 to 10 micrograms of galactose and mannose expected to be present in the hydrolysate.

Use two solvent systems one for each plate to develop the plates:

a) A mixture of formic acid, methyl ethyl ketone, tertiary butanol and water (15 : 30 : 40 : 15 by volume); and

b) A mixture of isopropanol, pyridine, acetic acid and water (40 : 40 : 5 : 20 by volume).

After development, spray with a solution of 1.23 g anisidine and 1.66 g phthalic acid in 100 ml ethanol and heat the plates at 100°C for 10 min. A greenish yellow colour is produced with hexoses, a red colour with pentoses and a brown colour with uronic acids. Compare sample spots with those for the solution of galactose and mannose.

ANNEX B

[*Table* 1, *Sl No.* (i)]

DETERMINATION OF GALACTOMANNANS

The difference between the sum of the percentages of acid insoluble matter, total ash, loss on drying, and protein and 100 represents the percent of galactomannans.

ANNEX C

[*Table* 1, *Sl No.* (vi)]

DETERMINATION OF ACID INSOLUBLE MATTER

Transfer 1.5 g of the sample, accurately weighed, into a 250 ml beaker containing 150 ml of water and 15 ml of 1 percent sulphuric acid. Cover the beaker with a watch glass and heat the mixture on a steam bath for 6 h rubbing down the wall of the beaker frequently with a rubber-tipped stirring rod and replacing any water lost by evaporation. At the end of the 6-hour heating period add about 500 mg of a suitable filter aid, accurately weighed, and filter through a tared Gooch crucible provided with an asbestos pad. Wash the residue several times with hot water, dry the crucible and its contents at 105°C for 3 h cool in a desiccator and weigh. The difference between the weight of the filter aid and that of the residue is the mass of acid insoluble matter.

ANNEX D

(*Clause* 4.5)

DETERMINATION OF RESIDUAL SOLVENTS BY GAS CHROMATOGRAPHY

D-1 EQUIPMENT

D-1.1 Gas Chromatography conditions

a) Column: 25 percent Diphenyl-75 percent dimethylpolysiloxane (60 m × 0.25 mm i.d., 0.25 ìm film) [Aquatic-2 (GL-Sciences Inc.) or equivalent]
b) Carrier gas: Helium
c) Flow rate: 1.5 ml/min
d) Detector: Flame-ionization detector (FID)
e) Temperatures:
   – injector: 280°
   – column: Hold for 6 min at 40°, then 40-110° at 4°/min, 110-250° at 25°/min, hold for 10 min at 250°- detector: 250°

D-1.2 Analytical Balance of least count = 0.000 1g

D-1.3 Wrist action mechanical shaker

D-2 REAGENTS

D-2.1 Ethanol, Chromatography grade

D-2.2 Isopropanol, Chromatography grade

D-2.3 Tertiary Butyl alcohol, Chromatography grade

D-2.4 Double Distilled water

D-2.5 Standard solutions

D-2.5.1 *Solvent Standard Solution*

Transfer 100 mg each of chromatography grade ethanol and isopropanol into a 100-ml volumetric flask containing about 90 ml water and dilute to 100 ml with water.

D-2.5.2 *TBA Standard Solution*

Transfer 100 mg of chromatography grade tertiary-butyl alcohol (TBA) into a 100-ml volumetric flask containing about 90 ml water and dilute to 100 ml with water.

Mixed standard solutions: Transfer 1, 2, 3, 4 and 5 ml of Solvent standard solution into each of five 100 ml volumetric flasks. Add 4 ml of TBA standard solution to each flask and dilute to volume with water.

D-3 SAMPLE PREPARATION

Disperse 1 ml of a suitable antifoam emulsion in 200 ml of water contained in a 1000 ml 24/40 round-bottom distilling flask. Add about 4 g of the sample, accurately weighed, and shake for 1 h on a wrist-action mechanical shaker. Connect the flask to a fractionating column, and distil about 95 ml, adjusting the heat so that foam does not enter the column. Add 4 ml of TBA standard solution to the distillate and make up to 100 ml with water to obtain the sample solution

D-4 STANDARD CURVES

Inject 1 µl of each mixed standard solution into the chromatograph. Measure the peak areas for each solvent and TBA. Construct the standard curves by plotting the ratios of the peak areas of each of the solvents/TBA against the concentrations of each solvent (mg/ml) in the mixed standard solutions.

D-5 PROCEDURE

Inject 1 µl of the Sample solution into the chromatograph. Measure the peak areas for each solvent and TBA. Calculate the ratios of the peak areas of each solvent/TBA, and obtain the concentration of each solvent from the standard curves.

Calculate the percentage of each solvent from:

$$\text{Percent solvent} = (C \times 100/W \times 1\,000) \times 100$$

where

C = concentration of solvent (mg/ml), and
W = weight of sample (g).

Bureau of Indian Standards

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.org.in

Regional Offices:		*Telephones*
Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	2323 7617 2323 3841
Eastern	: 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700054	2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, CHANDIGARH 160019	26 50206 265 0290
Southern	: C.I.T. Campus, IV Cross Road, CHENNAI 600113	2254 1216, 2254 1442 2254 2519, 2254 2315
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